

Name: _____

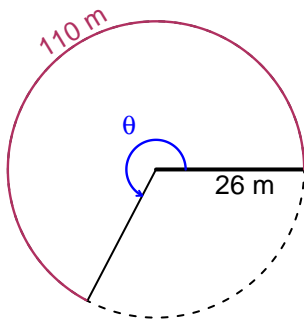
Date: _____

Trig Final (SLTN v617)

- You should have a calculator (like [Desmos](#)) and a [unit-circle](#) reference sheet.

Question 1

In the figure below, we see a circle and a central angle that subtends an arc. The arc length is 110 meters. The radius is 26 meters. What is the angle measure in radians?

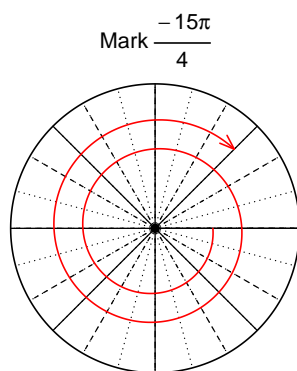


$$\theta = \frac{L}{r} \quad r = \frac{L}{\theta} \quad L = r\theta$$

$\theta = 4.231$ radians.

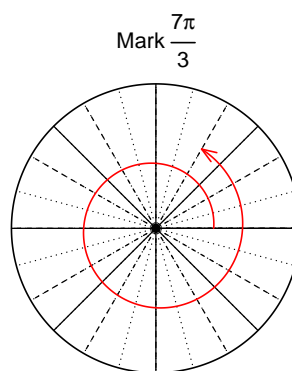
Question 2

Consider angles $-\frac{15\pi}{4}$ and $\frac{7\pi}{3}$. For each angle, use a spiral with an arrow head to **mark** the angle on a circle below in standard position. Then, find **exact** expressions for $\sin\left(-\frac{15\pi}{4}\right)$ and $\cos\left(\frac{7\pi}{3}\right)$ by using a unit circle (provided separately).



Find $\sin(-15\pi/4)$

$$\sin(-15\pi/4) = \frac{\sqrt{2}}{2}$$



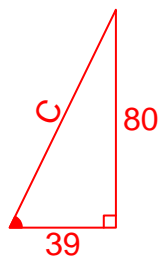
Find $\cos(7\pi/3)$

$$\cos(7\pi/3) = \frac{1}{2}$$

Question 3

If $\tan(\theta) = \frac{80}{39}$, and θ is in quadrant III, determine an exact value for $\sin(\theta)$.

Ignore any negatives and the quadrant, and draw a right triangle (based on SOHCAHTOA) in standard (quadrant I) orientation.



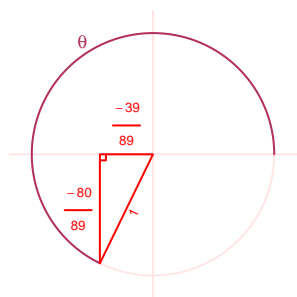
Solve the Pythagorean Equation

$$39^2 + 80^2 = C^2$$

$$C = \sqrt{39^2 + 80^2}$$

$$C = 89$$

Rescale the triangle so the hypotenuse is 1. Reflect the triangle into Quadrant III in a unit circle.



$$\sin(\theta) = \frac{-80}{89}$$

Question 4

A mass-spring system oscillates vertically with a frequency of 4.36 Hz, an amplitude of 5.48 meters, and a midline at $y = -7.63$ meters. At $t = 0$, the mass is at the midline and moving down. Write an equation to model the height (y in meters) as a function of time (t in seconds).

Any of these equations would get full credit.

$$y = -5.48 \sin(2\pi 4.36t) - 7.63$$

or

$$y = -5.48 \sin(8.72\pi t) - 7.63$$

or

$$y = -5.48 \sin(27.39t) - 7.63$$